

## Hepatic capillariasis in a Cape ground squirrel (*Xerus inaurus*)

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### ABSTRACT

We report, for the first time, an incidental finding of *Calodium hepaticum* infestation in a sub-adult female Cape ground squirrel (*Xerus inaurus*). *Post mortem* examination of the squirrel revealed severe haemoperitoneum, splenomegaly and hepatomegaly with miliary white spots distributed diffusely throughout the hepatic parenchyma. Histologically the portal tracts in the liver showed granulomatous inflammation with fibrosis and numerous giant cells. Occasional adult worms were identified and there were multiple *C. hepaticum* eggs distributed diffusely throughout the portal tracts and the parenchyma. The spleen also contained *C. hepaticum* eggs. The genus *Rattus* is the primary host and reservoir of *C. hepaticum*, but *C. hepaticum* infections have been reported previously in other Sciuridae. Based on our findings, people should be cautious of the zoonotic potential of *C. hepaticum*, when they come into contact with the Cape ground squirrel.

**Keywords:** *Calodium hepaticum*, Cape ground squirrel, capillariasis.

Erlwanger, K H, De Witt B A, Fick L G, Hetem R S, Meyer L C R, Mitchell D, Wilson W A, Mitchell B **Hepatic capillariasis in a Cape ground squirrel (*Xerus inaurus*)**. *Journal of the South African Veterinary Association* (2009) 80(4): 276–277. Brain Function Research Group, School of Physiology, University of the Witwatersrand Medical School, 7 York Rd, Parktown, 2193 South Africa.

The parasitic nematode *Calodium hepaticum* is distributed worldwide. The genus *Rattus* is the primary host and reservoir of *C. hepaticum*<sup>11</sup>. Infection of other mammalian species, including rodents, lagomorphs, canids, equids and primates<sup>7,9</sup>, occurs as a result of ingestion of feed, water or soil contaminated with embryonated *C. hepaticum* eggs, which can remain viable for up to 3 years in the environment<sup>10,11</sup>.

We report, for the first time, an incidental case of severe infestation with *C. hepaticum* (syn. *Capillaria hepatica*) in a Cape ground squirrel (*Xerus inaurus*). The Cape ground squirrel is a predominantly herbivorous rodent inhabiting the arid areas of southern Africa<sup>12</sup>.

A study aimed at investigating thermoregulation in Cape ground squirrels, was conducted at Moolmanshoek Private Game Reserve in the Eastern Free State, South Africa (28°38'S, 28°01'E). All experimental procedures were approved by the Animal Ethics Committee of the University of Cape Town, (Approval No. 2002/V09/JOR). Squirrels were captured with

carnivore trap cages (1.0 × 0.4 × 0.4 m) which were baited with peanut butter and placed around the entrances of the colony burrows. A total of 19 squirrels were anaesthetised with halothane (Fluothane Zeneca, Johannesburg) in oxygen. Thermometric data loggers (iButton, DS1922L, Maxim, USA) were implanted intra-abdominally via a 20 mm ventral midline incision which then was sutured closed. Vital signs were monitored throughout the surgical procedure, which lasted approximately 15 minutes. Each squirrel received a non-steroidal anti-inflammatory drug and a long-acting antibiotic. All the squirrels were recaptured after 52 days for removal of the data loggers using the same techniques described above.

Shortly after the routine surgery to remove the data loggers, 1 of the 19 squirrels, a subadult female weighing 494 g, died unexpectedly. Although her body condition was considered fair, her coat was dull, dry and scruffy. During the surgery the veterinarian noted that the liver appeared enlarged, pale and had miliary white spots distributed diffusely over its surface. Similar lesions were also noted in the other 18 squirrels that underwent surgery, but these lesions were less severe. It also was noted that haemostasis was prolonged in this squirrel compared to the other squirrels. Although no external

bleeding was noted from the surgical site on completion of the surgery, the squirrel died about 2 hours later.

A *post mortem* examination revealed severe haemoperitoneum with no other visible location of haemorrhage other than the surgical wound. The liver was enlarged, pale and friable with miliary white spots distributed diffusely throughout the parenchyma. The spleen was enlarged but the rest of the abdominal and thoracic organs appeared normal. Samples of the viscera were collected in 10 % buffered formalin and submitted for histopathological examination following routine processing and staining with haematoxylin and eosin.

During histopathological examination it was noted that the liver architecture was profoundly distorted. The portal tracts showed granulomatous inflammation with fibrosis, chronic inflammation and numerous giant cells. In addition, there were multiple *C. hepaticum* eggs distributed diffusely throughout the portal tracts and the parenchyma (Fig. 1). The eggs were bioperculate, barrel-shaped and thick-shelled with the outer shell layer containing striations (Fig. 2). Occasional adult worms also were identified. The spleen appeared congested and also contained *C. hepaticum* eggs associated with hyperplasia of the white pulp. The lymph nodes appeared reactive and there was focal atelectasis of the lungs, whereas the kidney and pancreatic tissue appeared morphologically normal.

*Calodium hepaticum* can cause severe liver damage<sup>5</sup>. The severe capillariasis seen in this squirrel could have caused the coagulopathy and consequent death post-surgery. Coagulopathy is common in acute and chronic liver damage/failure, since the liver plays a key role in the synthesis and metabolism of pro- and anticoagulant proteins<sup>1</sup>. Liver failure is also associated with thrombocytic defects which can contribute to haemostatic deficiency<sup>6</sup>.

Although we provide the first evidence for *C. hepaticum* infection in Cape ground squirrel, *C. hepaticum* infections have been reported in other Sciuridae, including Korean squirrels (*Tamias sibiricus*)<sup>3</sup> and

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Received: September 2009. Accepted: December 2009.

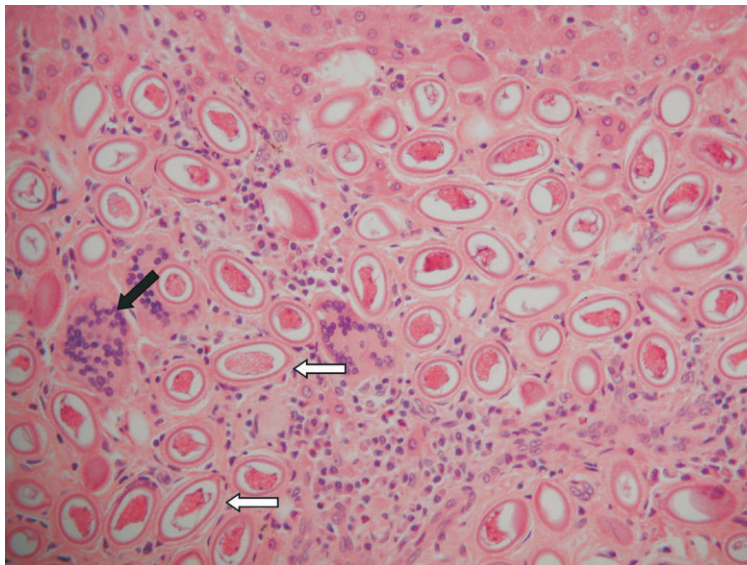


Fig. 1: Multiple *Calodium hepaticum* eggs (white arrows) and giant cells (black arrow) in a section of the liver. Haematoxylin & eosin,  $\times 200$ .

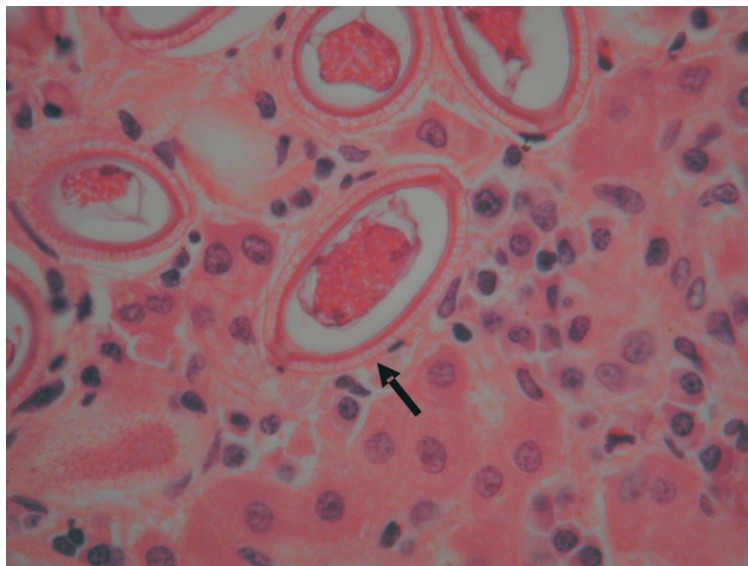


Fig. 2: A bioperculate *Calodium hepaticum* egg (black arrow). Haematoxylin & eosin,  $\times 600$ .

black-tailed prairie dogs (*Cynomys ludovicianus*)<sup>10</sup>. *C. hepaticum* is zoonotic and several cases of human infection have been reported, primarily in children<sup>2,4</sup>. In humans the clinical signs of infection with *C. hepaticum* include hepatomegaly, persistent fever and eosinophilia<sup>2,8</sup>. This first report of *C. hepaticum* infection of a Cape ground squirrel should make people wary of the zoonotic potential of

*C. hepaticum*, when they come into contact with the Cape ground squirrel and its habitat.

#### ACKNOWLEDGEMENTS

The authors would like to thank the Nel family of Moolmanshoek Private Game Reserve for their permission to trap and release Cape ground squirrels and for their support during the research. Dr

Rudi Bigalke (University of Pretoria) drew our attention to the prevalence of *C. hepaticum* in zoo animals. The contribution of the National Research Foundation by provided funding for the study is also acknowledged.

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